FREQUENCY METER

USER MANUAL

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Section one: General description

I、Introduction

This instrument is one of multifunctional and hi-precision frequency counters that measures frequency from 10Hz to 1000MHz

It has function for test of frequency, period, totalize and self-checking with 8digits, 7 segment bright LED display.

It has low power consumption circuit design, small size, light weight, high-stabilized crystal oscillator which can ensure precise measurement and full signal input checking. This hi-precision frequency counter is the first choices for product-line, school laboratory and radio maintenance

II、Specification

The pertinent specifications are listed as follows:

1. Measuring mode

1) Frequency measurements.

Channel A

Range: 10Hz～10MHz direct count

10MHz to 100MHz count in proportion

Direct count: 1Hz、10Hz、100Hz switch selectable.

Count in proportion:10Hz、100Hz、1000Hz switch selectable.

Gate time: 0.01s, 0.1s, 1s switch selectable.

Accuracy: ±1 count value ±base time error ×measured frequency

Channel B

Range: 100MHz～1GHz

Resolution: 100Hz、1kHz、10kHz

Gate time: 0.01s 、0.1s、1s

Accuracy: ±1 count value ±base time error × measured frequency

2) Period measurement

Input: Channel A

Range: 10Hz～10MHz

Resolution:10^{-7}s、10^{-8}s、10^{-9}s switch selectable

Accuracy: ±1count value ±base time error × measured period

3) Accumulated measurements

Input: Channel A

Range: 10Hz～10MHz

Resolution: ±1 count pulse

4. Self-checking

Display:8 LED display with 0～9 character simultaneous display

2. Input characteristics

1) Channel A

Input sensitivity

10MHz range:	10Hz～8MHz	20mVrms
	8MHz～10MHz	30mVrms
100MHz range:	10MHz～80MHz	20mVrms
	80MHz～100MHz	30mVrms

Attenuation: ×1, ×20 fixed

Filter (CH1 only) Low pass: AC 100 kHz-3dB

Impedance: Approximate 1MΩ (less then 35pF)

Maximum safety voltage: 250V (DC+ACrms)

2) Channel B

Input sensitivity: 20mVrms

Impedance: Approximate 50Ω

Maximum safety voltage: 3V

3. Time base

Time-base frequency 10MHz

Short- term stability: $\pm 3\times 10^{-9}$ / 1s (average)

Long -term stability: 2×10^{-5} /month

Temperature Coefficient: $\pm 1\times 10^{-5}$,0～40℃

Line voltage: the change of voltage of ±10% in each, the time-base frequency change $\pm 1\times 10^{-7}$

4. General

Display: 8 digits, 0.39 inch green LED display with decimal point, gate, KHz, MHz and μs indication.

Power requirement: AC 220V ± 10% 50Hz

Warm-up time: 20 minutes when cold started at 25℃

Temperature: rated range of use: -5～50℃

Storage and transport: -40～60℃

Humidity: operating: 10～90%RH

Storage: 5~95%RH

Dimension: 240mm×205mm× 85mm

Weight: about 2kg

5. Supplied accessories

Power cord	1
User manual	1
Testing line	1

Section three: Operation instruction

This section provides complete operating information for hi-precision frequency counter, including a description of all front panel controls, connectors and indicators, operating instructions as well as operator's maintenance.

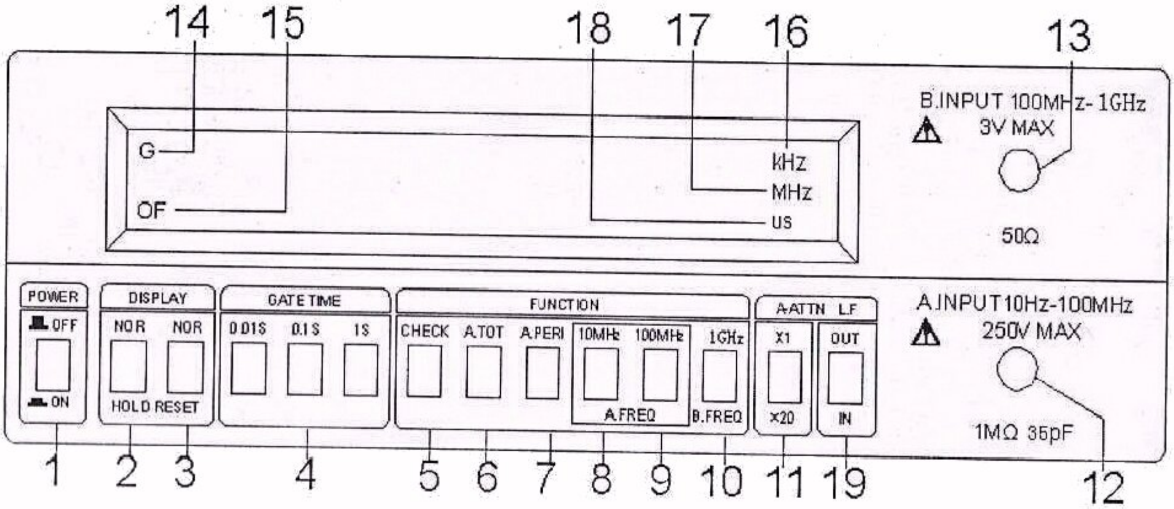
1. Preparation for use

1) Power requirements

AC220V ±10%, 50Hz signal phase, max powerdissipation: 10W

2) Warm up 20 minutes before use to make the frequency of crystal oscillator stable.

2. Features of panel features



1) Power switch: press the button to turn on.

2) Hold: press this button, the instrument will stop test and keep the data before stopping.

3) Reset: When pressed, immediately reset the counter to begin a new measurement, usually used in the totalize mode to begin a new measurement.

4) Gate time: select different resolution and counting cycle when it used for test of frequency and Cycle.

5) Check: check whether the counter and display function work normally. Press this button, 8 LED display with 0～9 character simultaneous display repeatedly.

6) A. TOT: Accumulation measurement. (Channel A input)

7) A. PERI: period test. (Channel A input)

8) A. FREQ: 10MHz: With this switch in, placed in 10MHz frequency mode.(channelA input)

9) A. FREQ: 100MHz: With this switch in, placed in 100MHz range frequency mode.(channel A input)

10) B. FREQ :(channel B input)

Switch: B FREQ. 1GHz

Range of frequency: 100MHz～1GHz

11) ATT: Input signal attenuator switch.

When pressed, the input sensitivity is reduced 20 times. (Only A input)

12) A INPUT: Channel A input connector.(When the amplitude of input signal is more than 300mV, please press the "ATT" to reduce the input signal to improve to accuracy of test value).

13) B INPUT: Channel B input connector.

14) Gate indicator: indicator ON or OFF state of the GATE, When GATE is ON, indicator is lighted.

15) OVERFLOW indicator: when the display over 8 digits, it is lighted.

16) KHz annunciator: the unit of frequency.

17) MHz annunciator: the unit of frequency.

18) Ms annunciator: the unit of period.

19) Lowpass filter: AC 100kHz ; 3dB

Attention: when all the function keys turn off , it will display model: "F-1000L"

3. Rear panel features

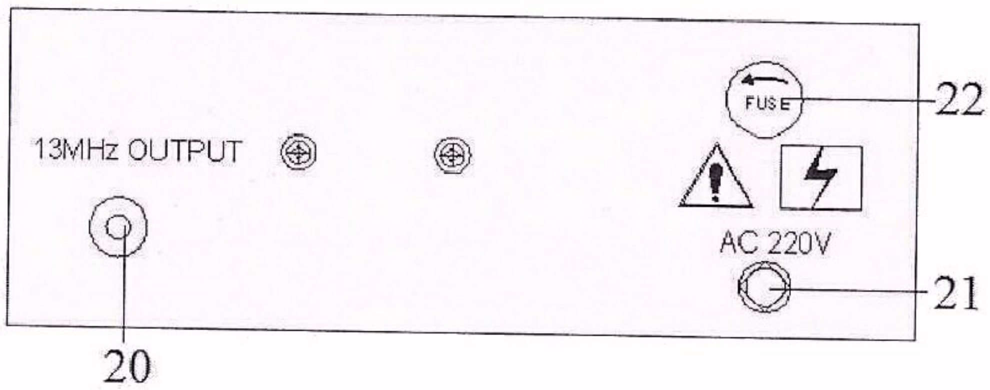


Figure 3

20) 13MHz output: Output connector of internal reference oscillator, this connector provides a 13MHz signal, It may be used as a reference signal for other frequency counters.

21) AC INLET: Provides connection to AC power.

AC220V±10%, 50Hz

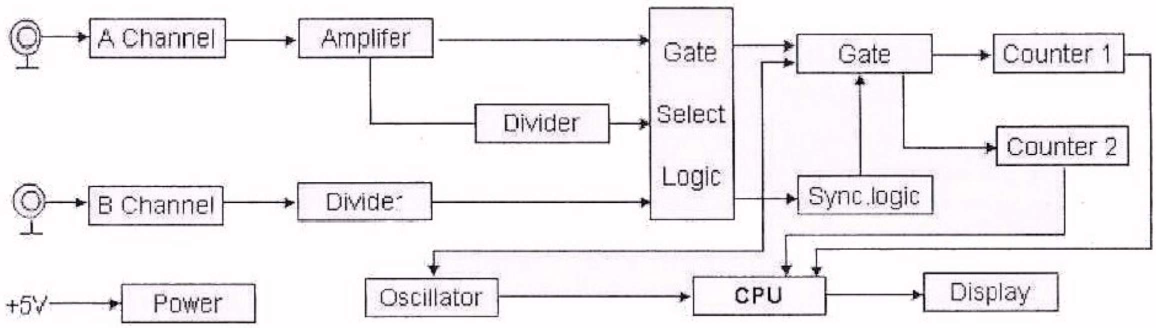
22) Fuse: AC power protection(0.3A/220V)。

Section two: Action principle

This instrument uses the principle of equal precision to measure frequency and period. That is to say, in predefined time Tx (Gate time), counter 1 counts Nx for integral pulses of measured signal while counter 2 counts No for standard pulses, and then frequency Fx and period Px of the measured signal can be determined by calculating formular easily.

Frequency Fx=Nx / Tx

Period Px=Tx / Nx



Section four: Calibration

1. Introduction

Calibration is limited to calibrate the base time oscillator frequency and the trigger level.

Base time oscillator should be calibrated whenever the oscillator is maintained or accuracy of the counter fails to meet the requirement. And the calibration of base time should be made under the condition that ambient temperature is between 22～25℃(72℉～77℉).before calibration, the instrument have to warm up at least 30 minutes.

Warning

Maintenance described here in is performed with power supplied to the instrument, And protective covers removed, such maintenance should be performed only by service-trained personnel who are aware of the hazard involved (For example, fire and electrical shock), Where maintenance can be performed without power applied, the power should be removed.

2. Test instruments required.

Quartz oscillator	Range: 13MHz～1GHz
	Temperature coefficient: $\pm 1\times10^{-8}$
Sine wave generator	Range: 10Hz～1MHz ; 1kHz～1GHz

3. Calibration of time-base frequency

1) Base time of channel A

a 、 input the signal that output by 10MHz Quartz oscillator to counter A.INPUT.

b、 Set the front panel controls as follow.

POWER________________________ON

NOR / HOLD____________________NOR

GATE TIME_____________________1s

FUNCTION A.FREQ.10MHz

ATT ×1

c、 when observing the counter display, the reading should be 10000,000…… ±1digit. If there are some errors, please adjust the frequency controlled capacitor C5 of time-base oscillator (see figure 4-1)

2) Base time of channel B

a) Input 1GHzstandard signal to counter B. INPUT.

b) Set the front panel controls as follow:

POWER________________________ON

NOR / HOLD____________________NOR

GATE TIME_____________________1s

FUNCTION_ . . . . B.FREQ. ATT

c) When observing the counter display, the reading should be 1000.000±1. If there are some errors, please adjust the frequency controlled capacitor C5 of time-base oscillator (see figure 4-1)

4. Trigger level calibration

a) Set sine wave generator to 10Hz,10MHz two frequency points to calibrate, amplitude to 20mVrms.

b) Connect generator to A. INPUT terminal of the front panel.

c) Set the front panel controls as follow

POWER . . . . ON

NOR / HOLD . . . . NOR

GATE TIME 1s

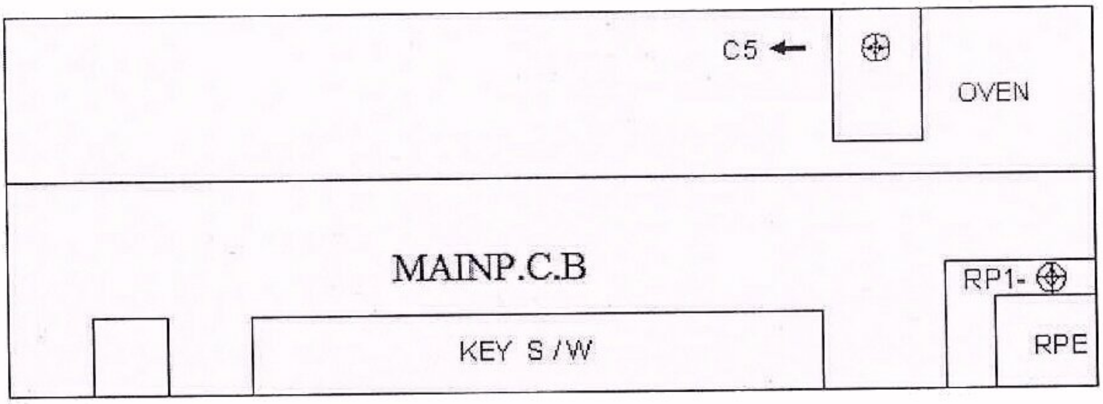
FUNCTION A.FREQ.10MHz

ATT . . . . ×1

d) Observing the count value, adjust the trigger level control (RP1 on the PCB)

to obtain a stable

Reading.



(Figure 4-1)